

1 WHAT IS CLAIMED IS:

2 1. A rapid cycle pressure swing adsorption oxygen concentration
3 method comprising:

4 (a) preparing a mechanical valve comprising at least one cam-actuated
5 flow control valve and a valve actuator having a rotating shaft and a cam
6 corresponding to each respective one of the at least one cam-actuated flow
7 control valve;

8 (b) interconnecting the cam with the rotating shaft;

9 (c) preparing a sieve tank having at least one molecular sieve bed filled
10 with molecular sieve materials;

11 (d) mounting the mechanical valve on the sieve tank to make the at least
12 one cam-actuated flow control valve selectively switch an airflow direction of
13 air for the at least one molecular sieve bed as the at least one cam-actuated flow
14 control valve is actuated;

15 (e) rotating the rotating shaft thereby the cam actuates the corresponding
16 one of the at least one cam-actuated flow control valve; and

17 (f) separating oxygen from the air incoming into the at least one sieve
18 bed.

19 2. The method as claimed in claim 1, wherein the at least one cam-
20 actuated flow control valve is a 2-position, 2-way air pilot directional flow
21 control valve.

22 3. A rapid cycle pressure swing adsorption oxygen concentrator
23 comprising

24 a sieve tank having

1 a first molecular sieve bed filled with molecular sieve materials;
2 a second molecular sieve bed filled with molecular sieve materials;
3 and
4 an oxygen storage bed communicating with both the first and the
5 second molecular sieve beds and having a concentrated oxygen outlet tubing;
6 and
7 a mechanical valve mounted on the sieve tank and comprising
8 a mounting bracket mounted on the sieve tank and having an inner
9 space, an intake air entrance adapted to connect to a compressed air source and
10 an exhausting exit;
11 a valve actuator mounted on the mounting bracket and comprising
12 a motor mounted on the mounting bracket;
13 a rotating shaft mounted in the inner space of the
14 mounting bracket and being rotated by the motor;
15 five cams mounted on the rotating shaft and rotated by
16 the rotating shaft; and
17 five cam-actuated valves mounted in the inner space of
18 the mounting bracket, corresponding respectively to the five cams and
19 comprising a first valve interconnecting the first molecular sieve bed with the
20 exhausting exit, a second valve interconnecting the intake air entrance with the
21 first molecular sieve bed, a third valve interconnecting the first molecular sieve
22 bed with the second molecular sieve bed, a fourth valve interconnecting the
23 intake air entrance with the second molecular sieve bed and a fifth valve
24 interconnecting the second molecular sieve bed with the exhausting exit.

1 4. The rapid cycle pressure swing adsorption oxygen concentrator as
2 claimed in claim 3, wherein the motor is a stepper motor.

3 5. The rapid cycle pressure swing adsorption oxygen concentrator as
4 claimed in claim 4, wherein each of the cam-actuated flow control valves is a
5 2-position, 2-way air pilot directional control valve.

6 6. The rapid cycle pressure swing adsorption oxygen concentrator as
7 claimed in claim 5, wherein the valve actuator further comprises a covering
8 housing mounted on the mounting bracket to enclose the inner space.